

## CASE REPORT

# 3D TEE GUIDED PERCUTANEOUS TRANSVENOUS MITRAL COMMISSUROTOMY (PTMC)

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### ABSTRACT:

**BACKGROUND:** Rheumatic heart disease continues to be a major health burden in developing world. Mitral valvular stenosis is its most common sequelae. For most individuals with symptomatic mitral stenosis, (PTMC) remains the most viable option and the treatment of choice for patient with mitral stenosis.<sup>1</sup> It carries risk of pericardial tamponade due to the inability to directly visualize the atrial septum under fluoro guidance. Incorporation of easily available TEE modality can make it highly safe due to capability of performing the septal puncture under direct visualization.

**CASE PRESENTATION:** A young male patient, known as case of pliable Mitral stenosis, with no LAA thrombus was enrolled for a PTMC. The echocardiographic mitral valve area was 0.8cm<sup>2</sup>. Patient was prepared in a standard way that included NPO of 08 hours. Right groin venous and arterial access was obtained and the all steps of PTMC were carried in a standard way. A TEE probe was inserted before the septal puncture, under conscious sedation. A TEE guidance using mid-esophageal views, was added for septal puncture that resulted in an extremely safe and successful PTMC procedure. Intraprocedural 3D TEE visualization while balloon positioning across mitral valve and for assessing immediate post ballooning mitral valve area and mitral regurgitation exponentially improved the efficacy and safety of procedure. The post procedure mitral valve area was 1.9cm<sup>2</sup>, and there was grade 2 mitral regurgitation. The patient tolerated the procedure well and was successfully discharged 12 hours later.

**MANAGEMENT & RESULTS:** Careful patient selection is cornerstone for PTMC. Successful PTMC done which in minimally invasive and effective procedure with good post PTMC results.

**CONCLUSION:** To sum up, (PTMC) has proven to be a highly effective technique, but even in experienced hands it still carries a risk of cardiac tamponade.<sup>2</sup> Incorporation of an easily available modality like a TEE virtually abates this risk.

**KEY WORDS:** Trans-esophageal echocardiography, percutaneous transvenous mitral commissurotomy, mitral stenosis, rheumatic heart disease

**INTRODUCTION:**

Millions of people worldwide are impacted by mitral stenosis, which is largely a result of rheumatic heart disease and is still a major global health problem. When the mitral valve narrows, blood flow from the left atrium to the left ventricle is impeded, which leads to elevated left atrial pressure, pulmonary congestion, and symptoms. Prior to the development of Percutaneous Transvenous Mitral Commissurotomy (PTMC), mitral stenosis was treated surgically. PTMC is the mainstay of rheumatic MS management in patients with suitable anatomy as most patients have excellent outcomes with long-term freedom from surgery.<sup>1</sup> However, it is important to note that TEE-guided PTMC requires significant expertise and experience. The success rate of TEE-guided PTMC was significantly higher in experienced operators compared to less experienced operators and with no mortality or post procedure complications with addition, there is a risk of complications associated with the procedure, such as cardiac perforation and thromboembolism.<sup>2</sup> This procedure has since changed the course of treatment. Real time three-dimensional transthoracic echocardiography (RT3DE) provided accurate measurements of MVA, similar to 2D planimetry. RT3DE also improved the description of valvular anatomy and provided a unique assessment of the extent of commissural

splitting.<sup>3</sup>

Historically, open-heart surgical techniques such surgical commissurotomy or mitral valve replacement have been linked to mitral stenosis. But the advent of PTMC provides a less intrusive option, allowing medical professionals to treat mitral stenosis by means of a percutaneous procedure.

**CASE PRESENTATION:**

A 31-year-old male presented to the hospital with shortness of breath, fatigue, and palpitations. He had a history of rheumatic heart disease with severe mitral stenosis. The patient was evaluated by a cardiologist and underwent a TEE, which revealed no commissural calcification, pliable valve. Left atrial appendage clear, dilated LA with spontaneous echo contrast and no clot seen. Showing rheumatic mitral valve with severe stenosis.

MVA = 0.9 cm<sup>2</sup>, MV PPG = 37 mm hg and MV MPG = 26 mm hg

Mild mitral regurgitation

Normal aorta throughout its course.

**MANAGEMENT & RESULTS:**

The patient was planned for a PTMC procedure under TEE guidance. After obtaining informed consent, the patient was taken to the catheterization laboratory, and under local anesthesia and conscious sedation, a 6F sheath was inserted

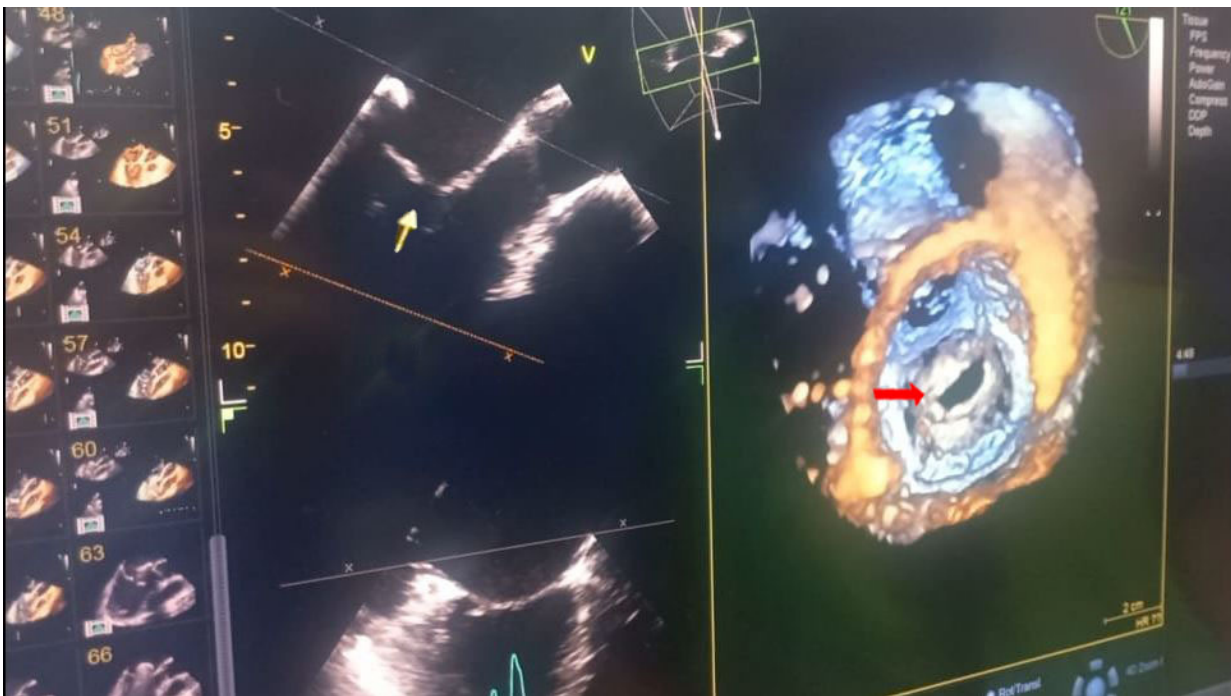


Fig 1. 2D and 3D TEE images of mitral stenosis before PTMC.

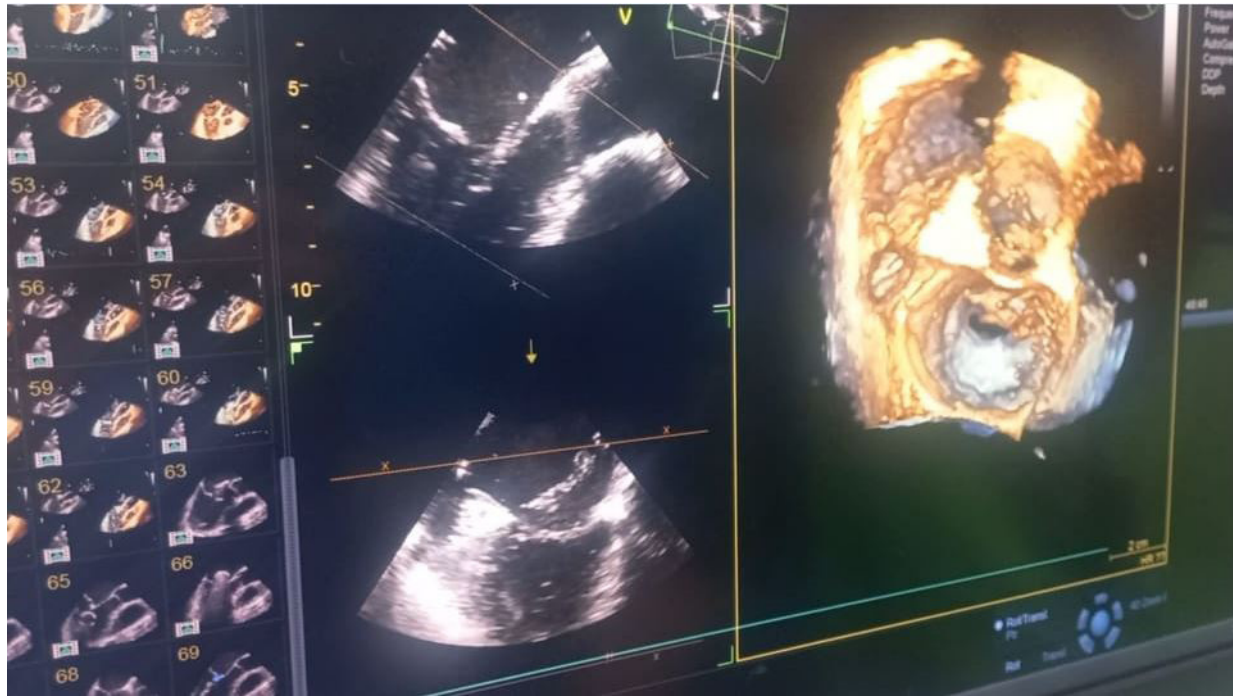


Fig 2. 2D and 3D TEE images for the placement of the Inoue balloon.

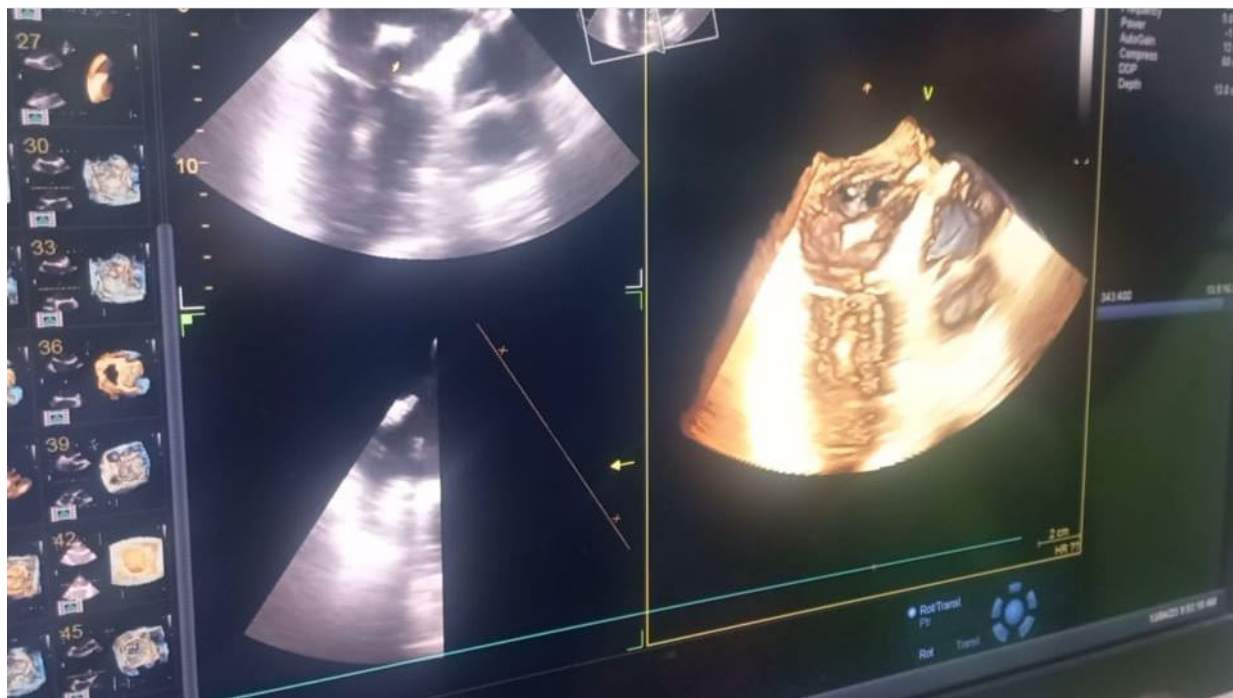


Fig 3. 2D and 3D TEE images for the placement of the Inoue balloon.

into the right femoral vein. A pigtail catheter was placed in the left ventricle, and a trans-septal puncture was performed under TEE guidance using a Brockenbrough needle.

Once the transseptal puncture was successful, a 0.035-inch wire was advanced into the left atrium,

followed by the introduction of a 9F Mullins sheath. A 3D TEE was used to guide the placement of the Inoue balloon catheter across the mitral valve. The balloon was inflated, and the commissures were split in two inflations. The balloon was deflated, and the valve was assessed by TEE, which showed

an increase in MVA to 1.5 cm<sup>2</sup>.

The patient tolerated the procedure well and was observed in the hospital for hours. Repeat TEE to be done before discharge to assess MV Area.

#### **DISCUSSION:**

Mitral stenosis is a common valvular heart disease, especially in developing countries where rheumatic fever is prevalent. PTMC has emerged as a safe and effective alternative to surgical intervention in patients with severe mitral stenosis. TEE has become an essential tool for guiding PTMC procedures, allowing real-time imaging of the mitral valve and precise guidance during the procedure. The introduction of 3D TEE has further improved the accuracy and safety of PTMC.

In our case report, we presented a successful TEE-guided 3D PTMC procedure in a patient with severe mitral stenosis. The use of TEE allowed for precise guidance of the Inoue balloon catheter across the mitral valve, resulting in a successful split of the commissures and an increase in MVA from 0.9 cm<sup>2</sup> to 1.5 cm<sup>2</sup>.

Previous studies have shown that TEE-guided PTMC is a safe and effective treatment option for patients with severe mitral stenosis, with high success rates and low complication rates. The use of 3D TEE has been shown to improve the accuracy of mitral valve measurements and reduce the need

for additional imaging modalities.<sup>4</sup>

Despite these limitations, TEE-guided 3D PTMC remains a promising treatment option for patients with severe mitral stenosis. Further studies are needed to evaluate its long-term efficacy and safety.

Our case report highlights the successful use of TEE-guided 3D PTMC in a patient with severe mitral stenosis. The use of TEE allowed for real-time visualization of the mitral valve and precise guidance during the procedure, resulting in a successful outcome. This case adds to the growing body of literature supporting the use of TEE-guided PTMC as a safe and effective treatment option for patients with severe mitral stenosis.<sup>5</sup>

#### **CONCLUSION:**

TEE-guided 3D PTMC is a promising treatment option for patients with severe mitral stenosis, offering real-time visualization and precise guidance during the procedure. The use of 3D TEE has further improved the accuracy and safety of the procedure. However, it requires significant expertise and experience and is not without risk.<sup>5</sup> Further studies are needed to evaluate its long-term efficacy and safety. Overall, our case report highlights the successful use of TEE-guided 3D PTMC in a patient with severe mitral stenosis, and adds to the growing body of literature supporting its use as a safe and effective treatment option.

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